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[redacted]

(IN TRIPLICATE) 28 March 1958

U. S. Government

Attention: Gentlemen

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Subject: CS-8 Broadband Antenna System, Submission of Quotation for [redacted]

Enclosure: (A) Estimated Cost Analysis, in triplicate

(B) [redacted] Equipment Proposal, C&P No. 1072, in triplicate

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Gentlemen:

Pursuant to a recent request, the bidder submits the following quotation together with its estimated cost analysis, Enclosure (A), and engineering proposal, Enclosure (B):

Item	Description	Estimated Selling Price
1	Development of CS-8 Broadband Antenna System	$29,232.94
2	Construction of One (1) CS-8 Broadband Antenna System	10,480.25
3	Instruction Book, one to ten copies	1,131.31
	Total Estimated Selling Price	$40,844.50
	Total Estimated Cost	$37,131.36
	Total Fixed Fee	3,713.14
	Total Estimated Selling Price	$40,844.50

The above equipment shall be in accordance with the specifications as noted below:

A. Frequency range from 30 mcs to 600 mcs in one antenna.

B. A bidirectional beam pattern is permissible provided the maximum gain exceeds a dipole and holds to one bearing through the entire range

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C. Antenna input impedance as established by the receiver can be either 150 ohms unbalanced or balanced.

D. Circular polarization is preferred but should the antenna be linearly polarized, mounting arrangements are required for both vertical and horizontal positioning.

E. Antenna portability is required for easy mounting and movement between fixed points of operation.

F. A mounting mast should be included in 18 inch segments for height settings between 4 to 15 ft. The base for supporting the mast might be a tripod which can self support the antenna at the lower elevations. Fittings should be provided to guy the mast at the higher limits.

G. All elements of the antenna cannot exceed 18 inches in the collapsed condition.

The bidder's proposed method for achieving the design and development of the CS-8 Antenna System is outlined in Enclosure (B).

This quotation is predicated upon the award of a mutually acceptable cost-plus-fixed-fee type of contract.

Delivery of the above items can be made in accordance with the following schedule:

Items	Delivery Date
1, 2 and 3	Four (4) months after receipt of contract award

In the event of award of contract based on this proposal, it is requested that provision be made for payments at intervals of not more than thirty (30) days, based on cost incurred and applicable proportion of the fixed fee.

Favorable consideration of the enclosed quotation is respectfully requested. Representatives of the bidder will be readily available in the event that further contractual or technical discussion is necessary. In matters pertaining to this quotation, please reference the subject proposal and address all inquiries to Mr. [redacted] 25X1 Contract Administrator, [redacted] 25X1, Telephone EMpire 3-0151, Extension 231. 25X1

Very truly yours,

[redacted] 25X1

Contract Administrator

GWB/NKG/js

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Report No. CEP-1072
Copy No. 2
Bid Request No. 5302

PROPOSAL FOR

CS-8 BROADBAND ANTENNA

28 March 1958

Prepared For

THE U.S. GOVERNMENT

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A PUBLICATION OF

THE RESEARCH AND DEVELOPMENT LABORATORIES

Department 12

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Printed in the United States of America

Proposal For
CS-8 BROADBAND ANTENNA

This is a proposal for a broadband, high-gain unidirectional antenna system. In the assembled position, the antenna and mount must fit within the confines of a volume 7 feet high and 9 feet square. The lower frequency limit which will be governed by the size of this volume will be approximately 70 mc and the upper limit will be 600 mc. Linear polarization with the ability to obtain both horizontal and vertical polarization is required of the system. Either a 150-ohm balanced or 150-ohm unbalanced feed line is permissible for use with the antenna.

Compactness and portability are required for easy mounting and movement. The mounting mast and any part of the antenna itself shall not exceed 18-inch lengths. The mounting mast will be such that height settings between 4 and 15 feet can be obtained for outdoor mounting. A self-supported unguyed structural system is desired for the lower elevations, and hardware and fittings are provided for guying the structure at the higher elevations.

Figure 1 shows one of the proposed structures which will satisfy the requirements. Figure 2 shows an alternate structure which will also satisfy the requirements. Both figures are logarithmically periodic antennas, figure 1 being a trapezoidal type self-supported structure and figure 2 being a triangular tooth self-supported structure. Both the horizontal and vertical polarizations can be obtained by manually rotating the antenna through 90 degrees. Both type structures can satisfy the requirements set forth, but the decision as to which would be better from a practical standpoint will be deferred until further study and consultation have been obtained.

The structures shown in figure 1 and 2 have the following parameters: τ ratio of .6, α and ψ angles of 60° and 45°, respectively. The τ ratio is obtained by taking the quotient

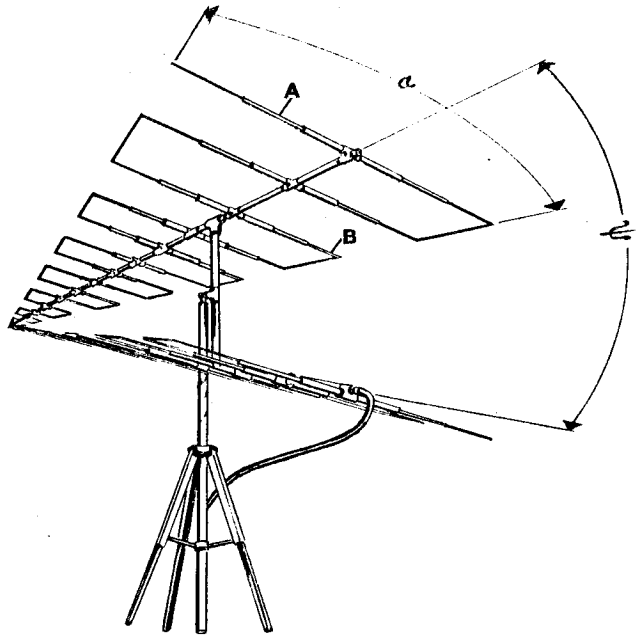
of the lengths of elements C and A, or the ratio of any other such pair of teeth. Employing these particular design parameters, the requirements can be met. A nominal impedance of 150 ohms will be obtained with a unidirectional pattern. Free space half-power beamwidths will be 70° and 85° in the E and H planes, respectively. The expected gain will be approximately 7 to 8 db over an isotropic source with a front-to-back ratio of approximately 14 db. Methods of feeding the antenna with either 150-ohm unbalanced or 150-ohm balanced feed lines are shown in figures 3 and 4.

As mentioned above, the approximate low frequency limit will be 70 mc. This is assuming an unloaded structure. Several methods of artificially loading the structure will be examined in an effort to extend the low-frequency limit to 30 mc. The loading may prove to be too cumbersome and impractical to build, but every effort will be used in an attempt to overcome this obstacle.

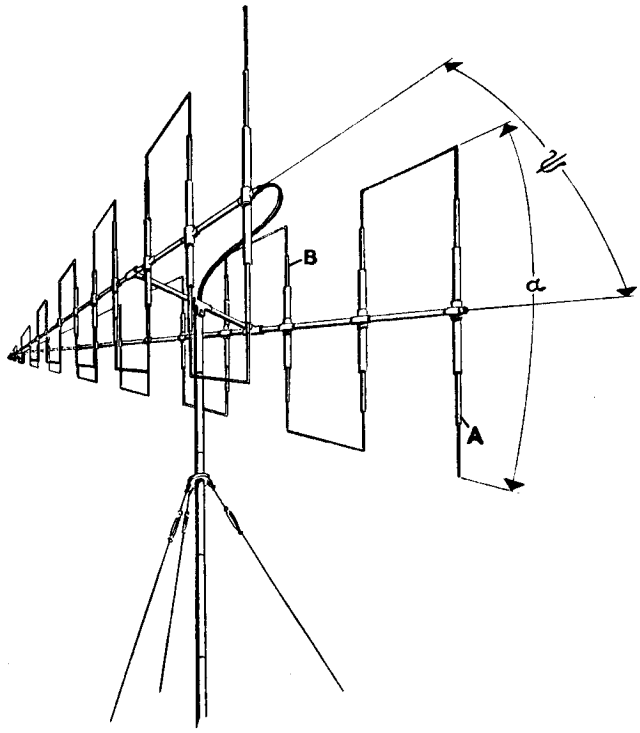
The periodic structure as described above will be supported on a mast which is connected to a cross-brace between the two arrays of elements by a hinged joint so that the polarization may be changed rapidly and easily. The lower end of the mast will be a folding tripod, to the top of which various numbers of mast sections and the antenna may be attached. At the lowest extension of the mast, the over-all height of the antenna in either polarization will be seven feet; at the greatest extension the height to the center of the antenna will be fifteen feet. Below mast heights of about seven feet, the structure will be self-supporting; but at greater heights and in high winds, the guy wires provided should be used.

The antenna will be constructed of aluminum tubing arranged in telescoping and folding sections of such size that no part of the dismantled antenna is longer than eighteen inches. The mast and tripod will also be constructed mainly of aluminum tubing but the mast will be composed of a number of interchangeable sections so the height may be adjusted in increments of approximately eighteen inches. On the mast, adjacent to the antenna, a ring will be provided for the attachment of 3 guy wires. The guy wires will be small diameter, steel aircraft cord and equipped with turnbuckles and arrowhead-type ground anchors.

The antenna will be capable of being packed in one box 20 inches by 20 inches by 12 inches and the mast and tripod in another box of the same size.



a. Horizontal Polarization



b. Vertical Polarization

Figure 1. Trapezoidal Tooth Structure

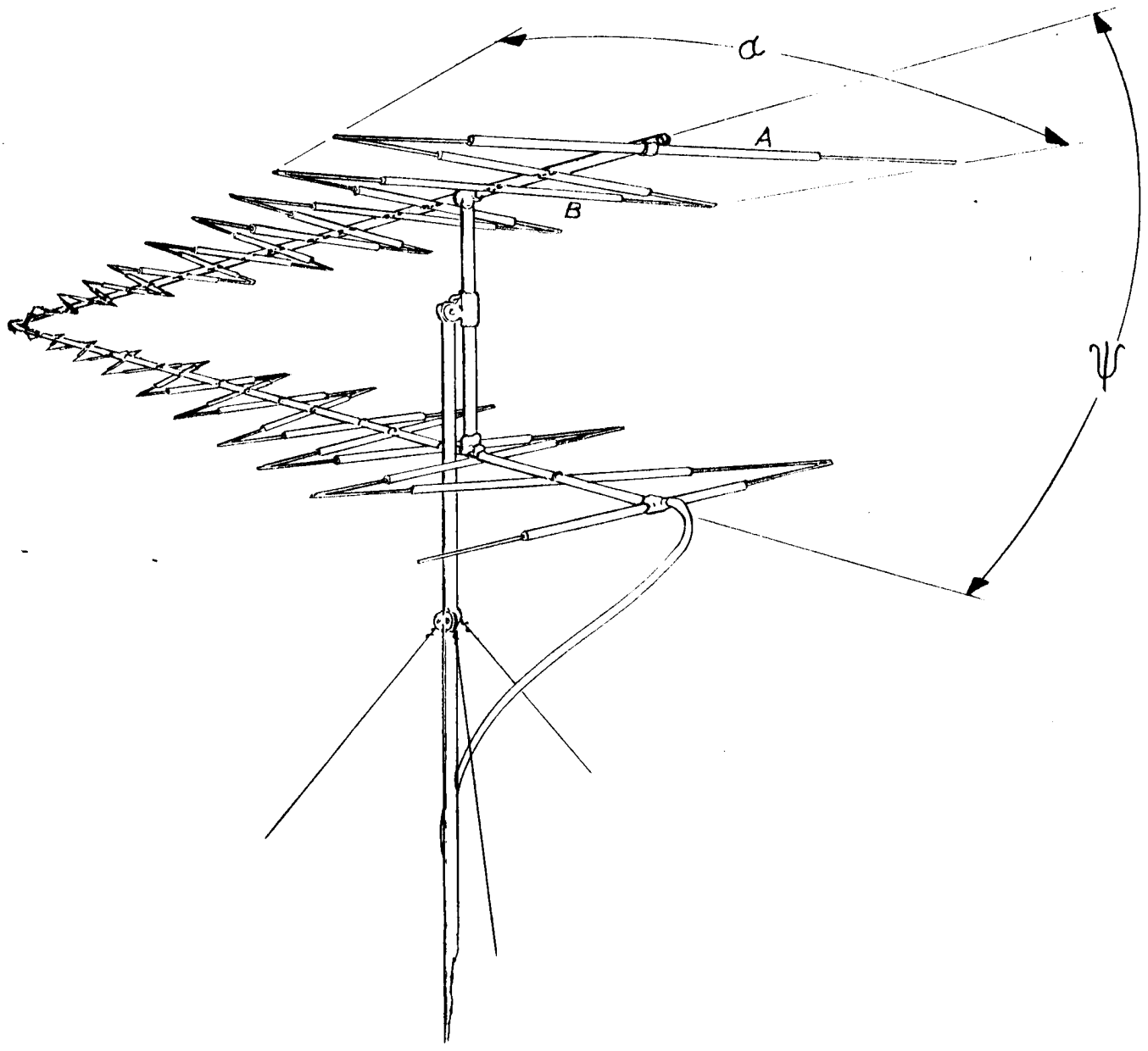


Figure 2. Triangular Tooth Structure

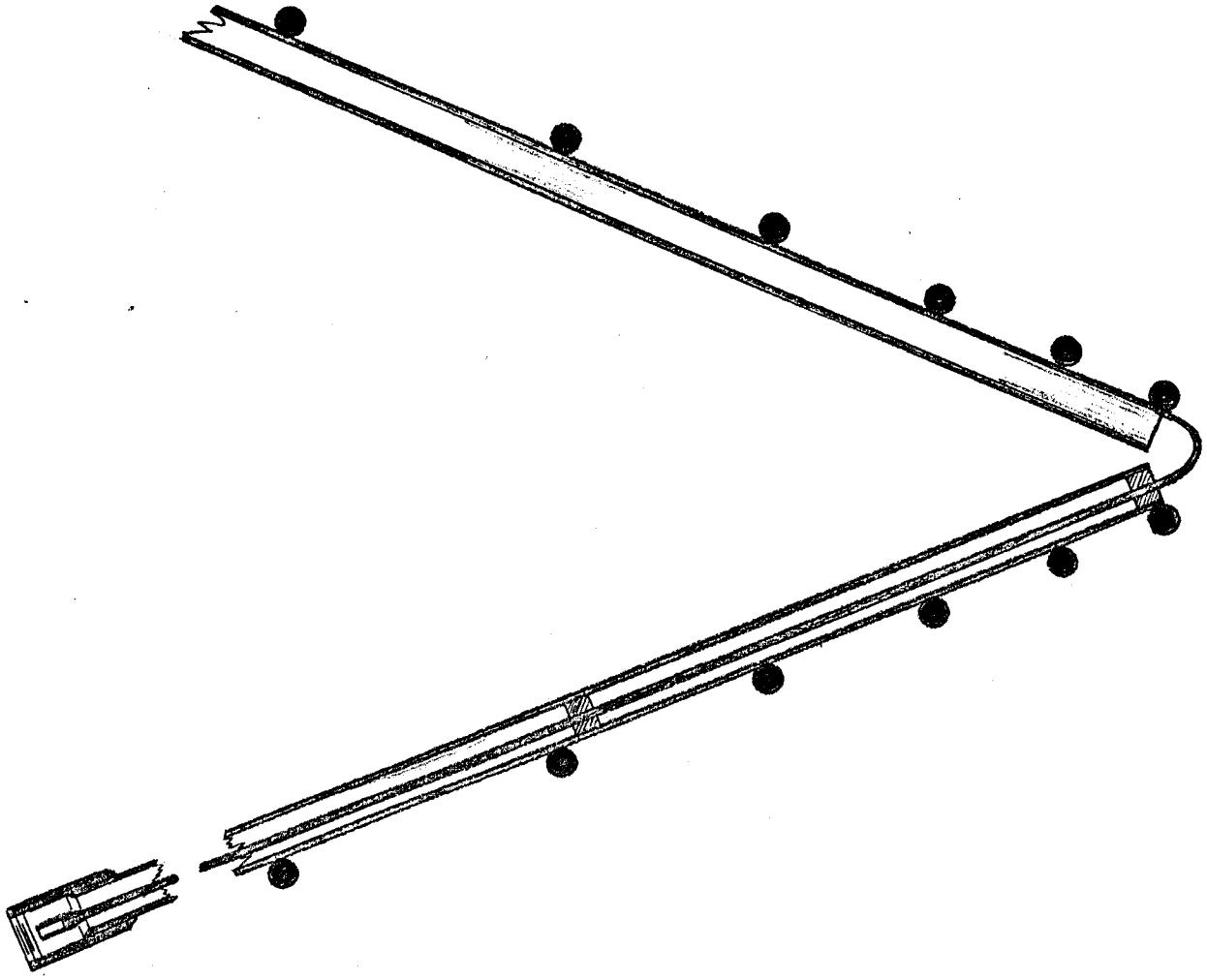


Figure 3. Unbalanced Feed System

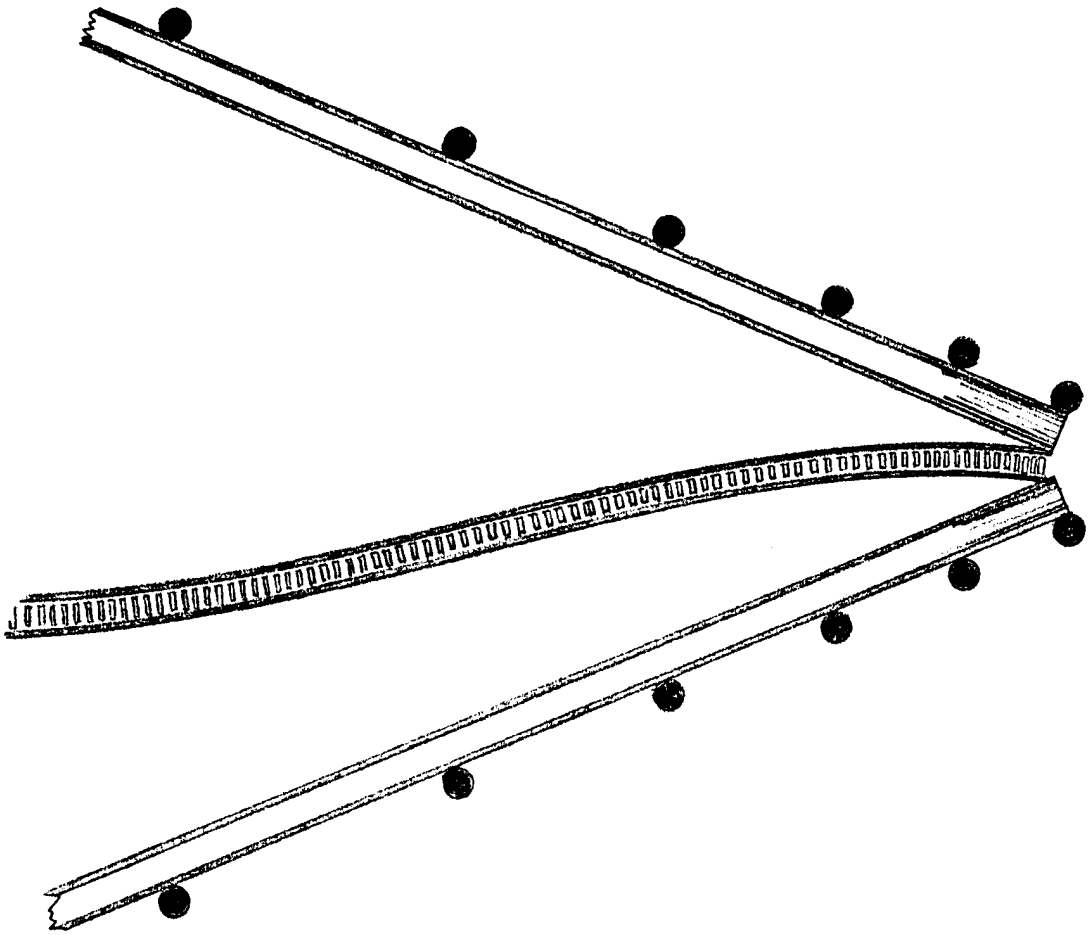


Figure 4. Balanced Feed System

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ESTIMATED COST ANALYSIS
CS-8 BROADBAND ANTENNA
FOR U. S. GOVERNMENT

Enclosure (A)
Letter to U. S. Government
Dated 28 February 1958

	Rate	Item 1 Development Hours	Item 1 Development Amount	Item 2 Construct One (1) Antenna Hours	Item 2 Construct One (1) Antenna Amount	Item 3 Instruction Books Hours	Item 3 Instruction Books Amount
Salaries & Wages							
Asst. Engr. 3525	$4.02	1520	$ 6,110.40	360	$ 1,447.20	80	$ 321.60
Sr. Lab. Asst. 1416	2.49	800	1,992.00	240	597.60		
Jr. Layout Draft. 1413	2.28	800	1,824.00	80	182.40	40	91.20
Model Shop	2.42	700	1,694.00	700	1,694.00		
Total Salaries & Wages			$11,620.40		$ 3,921.20		$ 412.80
Departmental Overhead							
Engineering	104%		6,354.82		1,505.09		334.46
Lab. Asst.	45%		896.40		268.92		
Drafting	81%		1,477.44		147.74		73.87
Model Shop	116%		1,965.04		1,965.04		
Departmental Overhead Expense			$10,693.70		$ 3,886.79		$ 408.33
G & A Overhead @ 36% of Direct La			3,021.30		1,019.51		107.33
Total Overhead Expense			$13,715.00		$ 4,906.30		$ 515.66
Material			1,000.00		700.00		100.00
Travel			240.00				
Total Estimated Cost			$26,575.40		$ 9,527.50		$1,028.46
Fixed Fee @ 10%			2,657.54		952.75		102.85
Total Estimated Selling Price			$29,232.94		$10,480.25		$1,131.31

Encl(2)

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